Defense Horizons
Number 46
A publication of the
Center for Technology and National Security Policy
National Defense University
DECEMBER 2004

Military Transformation and Joint Experimentation: Two Views from Above

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Overview

Military transformation— "a process that shapes the changing nature of military competition and cooperation through new combinations of concepts, capabilities, people and organizations"—is on the minds and agendas of everyone dealing with the military. Many people talk about transformation; the two authors of this *Defense Horizons* have done something about it. In fact, they are among the few who have been responsible for shaping and implementing the concept. To get a better idea of what goes into this process, particularly the element of joint experimentation that is helping to identify and define the nature of change, *Defense Horizons* presents the views of two of America's leading military officers who have been involved in the process.

Admiral Harold Gehman, the last commander of Atlantic Command (before it became Joint Forces Command, or JFCOM) and initiator of the Joint Experimentation Directorate, presents a framework for how experimentation can advance the goals of transformation and clarifies terms and relates them to the tasks at hand. He also considers the role of the joint experimentation process, uses historical analogies to identify the prerequisites for successful transformation, and gives examples of where earlier attempts have failed and why. Finally, he shows how joint experimentation can help achieve success in our current efforts by minimizing conditions that have brought about failure in the past.

Moving from the theoretical basis established by Admiral Gehman to practice, Major General James Dubik, Director of the JFCOM Joint Experimentation Directorate, describes how the Joint Concept Development and Experimentation Campaign is an important catalyst for transforming military capability. He describes the "two-path strategy to innovation" being employed, involving Joint Prototypes and Joint Concepts and actionable recommendations. He leads the reader through how this process is working today to achieve transformation.

The Role of Joint Experimentation

by Admiral Harold W. Gehman, Jr.

It seems impossible these days to pick up a military affairs journal or periodical without running into a discussion regarding something called transformation, often in association with a joint experimentation program. A sound joint experimentation program plays a crucial role in making genuine progress toward the goal of force transformation. A clear understanding of the scope and concept of transformation and joint experimentation is essential to useful discourse. However, much of what appears in print confuses rather than clarifies the issue. Before we can discuss the role of a joint experimentation program in military transformation, we need to agree on what transformation is. Once the meaning of the term has been settled, means must be devised to measure the effectiveness of a joint experimentation program in contributing to transformation.

Transformation Defined

While numerous definitions of transformation have been advanced, with dozens in use within the Department of Defense (DOD) alone, we will use the authoritative definition given in DOD planning guidance: "a process that shapes the changing nature of military competition and cooperation through new combinations of concepts, capabilities, people, and organizations that exploit our nation's advantages and protect against our asymmetric vulnerabilities to sustain our strategic position, which helps underpin peace and stability in the world."

Parsing this definition, we find some phrases worth noting:

- *a process.* That is good. Every speaker at every transformation conference in the last 3 years has said transformation is a journey, not a destination. Arbitrarily declaring where transformation is taking us would seem inconsistent with this agreed understanding of the process.

- *new combinations of concepts, capabilities, people, and organizations.* That is clear. We know our program must include

Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
DEC 2004	**N/A**	**-**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
Military Transformation and Joint Experimentation: Two Views From Above	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **National Defense University Center for Technology and National Security Policy Washington, DC**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release, distribution unlimited

13. SUPPLEMENTARY NOTES
The original document contains color images.

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			
unclassified	**unclassified**	**unclassified**	**UU**	**2**	

concepts (or doctrine), capabilities (or things), people with new skills, and new organizational structures. These four areas seem broad enough, and metrics can be set for these categories.

■ *exploit our nation's advantages and protect against our asymmetric vulnerabilities.* This seems rather limiting. It does not include, for example, noncontinuous change characterized by a dramatic "leap ahead." One suspects the authors did not intend to exclude discontinuous change and leap-ahead advances; it is safe to assume that breakthrough advances are always welcome.

■ *to sustain our strategic position.* This is clear but, again, rather limited.

A program of transformation, then, is a process, without a predetermined outcome, that involves new concepts, capabilities, and organizations, and skilled people to handle them. Further, we are engaged in this process to ensure that our current military advantages do not erode and to find ways to protect ourselves from new and emerging asymmetric threats.

There is nothing mysterious about this. The reason DOD has established an office and an official program to pursue transformation may be the belief that *business as usual would not achieve the desired result*. Neither would a personality-driven process in which the most influential member says: "This is where we are going; follow me." That approach lacks intellectual and factual underpinning. A more useful transformation process is one that relies on a methodical and scientific program of experimentation. An organization now exists for that purpose.

Joint Experimentation Defined

In 1999, responding to the urging of several members of the Senate Armed Services Committee, the Secretary of Defense created the joint experimentation program and tasked U.S. Joint Forces Command (JFCOM) to be the DOD executive agent. The JFCOM charter was framed in a single, half-page letter. Some amount of deduction as to the extent of the task and mission was required, and JFCOM took a while to make a good start.

The pros and cons of jointness have been argued long and hard, but jointness is at the core of transformation via joint experimentation. While not written anywhere, it is common and even popular among some senior service leaders to define *joint* as the blending or weaving together of service capabilities, requirements, and doctrine. In this view, nothing is uniquely joint; there is only a merging of service activities that results in jointness. Most observers realize that this definition is incorrect, but the concept endures nonetheless.

The DOD *Dictionary of Military Terms* defines *joint* as an activity involving the services from two or more of the military departments. Thus, an Army/Air Force parachute assault to seize an airfield is joint, whereas a Navy/Marine Corps amphibious assault to seize the same airfield is not. Getting the definition right has an enormous impact on the resultant program. It does not take much thought to make up a list of military activities that most people would consider joint. Such things as integrated air defense, joint fires, close air support, finding and striking critical mobile targets, theater ballistic missile defense, and opposed assault to seize forward operating bases are so heavily dependent on the coordinated and integrated activities of more than two services that the joint imperatives can be said to outweigh the service imperatives. These are joint operations. Others, such as measures to prevent fratricide, combat ID, and combat search and rescue, can be added to the list.

For the purposes of this discussion, we can accept that joint refers not only to operations involving two or more services, but also to military activities that are uniquely joint. Just as services have experimentation and transformation imperatives, so should the joint world. Just as there are joint forces and joint operations, there should be joint experimentation.

Experimentation

What exactly is an experiment, and how does it differ from the training, exercising, testing, and demonstrating that the Armed Forces do every day? When JFCOM initiated the joint experiment program in 1999, this dictionary definition of *experiment* was used: "a test, trial, or tentative procedure; an act or operation for the purpose of discovering something unknown or of testing a principle or supposition." An experiment, therefore, is not training, not a demonstration, not a proof of concept, and not a final test of some developmental product. One experiments to discover and learn and to test a supposition or hypothesis.

In the scientific sense, an experiment and its results must be repeatable to have any validity. The same applies to our task as well, since transformation demands we give up something known for something that merely promises more. Yet we must be sure our innovation works in all expected conditions before we give up our present capability, and repetition is not likely to receive support.

Unfortunately, while the dictionary definition of experimentation fits nicely with the military task of transformation, it does not lend itself well to the DOD budgeting and programming system, since that system wants to know what we are getting for the money we spend. To say we are going to spend X millions of dollars to discover something unknown is not well received by the budgetary system. Early in the DOD joint experimentation program, there was strong pressure for short-term results. Such pressure is inconsistent with a program of experimentation. Pressure for results suggests we know the answer and are merely demonstrating that it works.

In DOD, the second word of the phrase *experimental program* refers to a formally chartered and recognized enterprise, with resources (money and manpower), milestones, deliverables, and longevity. There is usually a program manager with clearly defined authorities to make the program a success. Normally the program manager can trade factors of quantity, schedule, cost, or performance margin; that is, if he is behind schedule, he can ask for more money; or if he is over budget he can reduce the performance requirements. Whether the owner of the joint experimentation program can exercise similar authority is yet to be determined.

Returning to the OSD definition of transformation, it seems that the formal definition of experimentation supports the Secretary of Defense's tasking. In practice, however, the pressures of the system constantly work to mold the actual experimentation program into something that resembles the well-known models for test and evaluation, research and development, or training and exercises.

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Transform What?

A rich history of military transformation going back at least to the introduction of the stirrup yields examples of success and failure and the characteristics of both. Study of these examples is essential; we ignore them at our peril. The lessons of history clearly remind us that transformation is not about technology, but rather about the elegant combination of technology, new doctrine to employ the technology properly, organizational concepts to meet the challenges of the opponent and employ the new doctrine correctly, and well-trained and educated people to lead the organizations. Focusing on the technology at the expense of the other factors is a mistake that has been repeated frequently. Examples that come to mind are General George Custer, who reportedly left his new Gatling Guns behind during the Indian Campaign, and Admiral Jackie Fisher, who revolutionized the Royal Navy's dreadnoughts by making them lighter and faster—though the Royal Navy at the Battle of Jutland fared somewhat better than Custer when it lined the fast, lightly armored dreadnoughts up with the slow, heavily armored dreadnoughts of the Kaiser.

History also teaches us that, in most cases, while the transformation may be completely successful, "the system" will not accept the new concept, capabilities, or organization until needed in crisis. Long before December 7, 1941, the U.S. Navy had demonstrated that carriers and carrier aviation could strike both land bases and ships, yet the battleship was still the capital ship of the Navy and the centerpiece of both doctrine and operational plans. Similarly, the principle of radar had been demonstrated in the 1930s, but it was not exploited.

Unfortunately, one cannot be certain in advance which new concept, capability, or organization will be needed. All too frequently, the measure of successful transformation has been the ability to reach down and bring up some new capability in an emergency to save the day. This line of thought argues against meeting deadlines and producing results.

With history as our guide, what should we be transforming today? The answer falls into two parts: first, things we do well now but need to do better; second, new things we cannot do now but project we will need to do to meet future challenges.

Improving the way we do some of the things we already do fulfills one part of OSD guidance: to "exploit our nation's advantages." It is not difficult to make a list of what these advantages are: strategic mobility, precision lethality, space-based and air-breathing intelligence gathering, motivated and trained force, and so on. There has been much analysis already of which of these is going to be challenged by opponents in the future and which probably will not be challenged directly. A program of experimentation to find ways to enhance our advantages and diminish an opponent's capabilities can be established in a rather straightforward manner. It would be an error, however, to determine the answer before the analysis has been done. For example, there are many ways to enhance strategic mobility, and building more airplanes or shrinking 70-ton tanks down to 25 tons may not be the best answer. Experimentation will yield the best answer.

Similarly, developing a program to determine what things we do not do now but must do in the future can be approached in a scientific, methodical manner. Here again, we must be careful to avoid the requirement to produce results on the basis of a schedule or predetermination. This part of transformation is more like curing cancer; we have to keep working hard at it, and cannot predict when results will be achieved. On the contrary, demands for results according to a schedule most likely would ensure failure.

Tailoring programs to one future is a bad bet. Most analysts think the best practice is to hedge our bets by preparing for an uncertain future. Hedging means preparing for a representative sample of the most likely and/or the most dangerous future scenarios to reduce the likelihood of strategic surprise. Preparing for the future does not mean acquiring massive amounts of hardware of every different kind that might possibly be used someday; rather, it means gaining the knowledge necessary to deeply understand the nature of a range of possible futures and what it will take to succeed. Again, it is much cheaper to prepare for a range of futures by experimentation than by acquisition.

The Role of Joint Experimentation

Taking advantage of the temporary lack of a global peer competitor to transform our military for future challenges is a logical and achievable goal. Doing so by a methodical and scientific process helps fend off the favorite projects of influential people and ensures as broad a range of possibilities as is practicable. The best course of action is a systematic program that looks at all possible options to meet the two guidance conditions (maximize present advantage and prepare for the future) presents unbiased options with data, studies, analysis, and ranges of variability and uncertainty, and makes recommendations for further studies. Just as the services have requirements to meet future challenges, so, too, does the joint community. In fact, the joint community's military challenges are more complex than any single service's. Because our doctrine states unequivocally that we are going to conduct operations of the future in a joint manner, the transformational challenges in the joint environment are significant. In fact, the problem is essentially unbounded.

It has been said that battle is the most arduous of all man's activities. An individual battle has hundreds if not thousands of variables. How, then, to conduct an experiment with hundreds if not thousands of variables? The only way is to break the activity down to parts, hold as many variables constant as possible, and repeat the experiment many times. Due to financial constraints, this process cannot be done on a grand scale. The program, therefore, has to include alternatives to expensive, grand field events. Alternatives include human-in-the-loop simulations, computer-based simulations, and seminar war games. It would be a mistake to measure experimentation progress by numbers of field events, numbers of troops or aircraft involved, or days at sea.

The direction of the joint experimentation program must be determined by what is learned from the experiments themselves, not by predetermined concepts seeking hoped-for results. Rarely, in the real world of scientific research for answers to hard technical questions, does the institution start out saying it knows the answer and needs to conduct research only to prove their correctness. A program that states the answer first and then attempts to confirm it is a program of test and evaluation, not experimentation. The process of experimentation, as noted above, is one of discovery.

If the joint experimentation program is to include experiments based on one or more favorite answers to future challenges, it can do so only by utilizing the second part of the definition ("testing a principle or supposition"). That is, it should be hypothesis-based: "If I can do X, then I will get the Y result I want." After the hypothesis has been established, experiments are designed to determine whether it is correct. Field events, which are designed to demonstrate that

a concept works, are not the same thing. Yet this is what the U.S. military generally does. Conducting a demonstration to prove the value of a pet innovation is a common fault of many experimentation programs, not just joint ones.

In sum, a program of true joint experimentation is an unbiased process that fuels transformation, helps to hedge against unexpected developments, and is the most likely way both to develop and keep alive the unpredictable capabilities we are likely to need in the future. The joint experimentation program can be driven by those things we presently do but need to do better and by a requirement to prepare for future capabilities we can only imagine. Unfortunately, an experimentation program cannot be driven by either calendars or output metrics. Programs that claim outputs in terms of papers published and books written are doing busy work.

The United States has an enormous advantage in having all the ingredients necessary to operate a truly effective joint program of experimentation. The question is, will it?

Delivering Innovation: Transforming the Military Through Creative Thinking and Intelligent Risk Taking

by Major General James M. Dubik, USA

The U.S. military has a long tradition of transformation through experimentation, from the Navy's fleet challenges in the 1930s, which gave birth to carrier tactics, to the Army's famous Louisiana Maneuvers of 1941, which developed the initial doctrine for combined arms air-ground operations. Now, a new era of military transformation is unfolding. The end of the Cold War, which changed the international security landscape, coincided with the emergence of the information age. As new threats arose, new warfighting tools and methods came to hand. These developments created both the need and the opportunity for broad transformation across all the services—for joint transformation.

As Admiral Gehman observed above, transformation is a process that enables joint forces to maintain and extend overmatching combat power by exploring, testing, and then establishing new combinations of concepts, capabilities, people, and organizations. Transformation ultimately means redefining standards for military success by accomplishing military missions that were previously unimaginable or impossible, except at prohibitive risk or cost. Military transformation is a key element of American national defense strategy.

Joint Forces Command has been an important element in the overall joint concept development and experimentation program for DOD since 1999. On October 1, 2002, JFCOM was designated the DOD Executive Agent for coordinating the transformation of our nation's joint warfighting forces.[4] As such, the JFCOM mission is to maximize military capabilities by leading the transformation of joint forces, through joint concept development and experimentation, identifying joint requirements, advancing interoperability, conducting joint training—all to support the combatant commands.

A coherently joint, network-centric, distributed force capable of making immediate, superior decisions and massing effects across the battlespace is the focus of this campaign plan. Employing the powerful tools of joint concept development and experimentation, the U.S. military can address, and possibly even anticipate, the challenges that threaten the security of the Nation and our allies. Transformed U.S. forces will continue to operate from a position of overmatching power, deterring conflict, dissuading adversaries, and assuring others of our commitment to a peaceful world.

The Joint Concept Development and Experimentation Campaign is an important catalyst for transforming military capability and forms an essential part of the top 10 DOD priorities:

- Successfully Pursue the Global War on Terrorism
- Strengthen Joint Warfighting Capabilities
- Transform the Joint Force
- Optimize Intelligence Capabilities
- Improve Force Manning
- Develop New Concepts of Global Engagement
- Pursue Counterproliferation of WMD
- Ensure Homeland Security
- Streamline Department of Defense Processes
- Improve Interagency Process, Focus, and Integration

This campaign aims to develop capabilities and concepts that, through vigorous debate, collaboration, refinement, prototyping, and experimentation, and to strengthen the effectiveness of joint force commanders in the field. Perhaps more important than fostering the creation of new concepts, the campaign serves as a mechanism to align the efforts of combatant commands, services, and interagency, multinational, and industry partners as we collectively develop capabilities and concepts. Finally, the campaign helps create an overall culture of innovation.

Approach to Innovation: A Two-Path Strategy

This campaign employs a two-path strategy that results in two distinct products. The first product consists of prototypes—improvements to near-term warfighting capabilities. The second consists of joint concepts and actionable recommendations—new approaches to capabilities that focus on the next decade.

To improve near-term warfighting capabilities, the campaign pursues a strategy of rapid prototyping. This strategy takes new ideas or concepts that originate on the joint concept development path, or from real-world operations, and converts them into physical form as prototypes. These prototypes are then put into the hands of joint warfighters in field exercises as quickly as possible.

The prototype path began to take shape immediately following Millennium Challenge 2002. During that experiment, combatant commanders and others saw the power of the body of concepts being explored. Following this experiment, the Chairman of the Joint Chiefs of Staff directed JFCOM to field Standing Joint Force Headquarters in each combatant command by FY 2005.[8] We have been aggressively partnering with regional combatant commanders to execute this directive. We have taken sufficiently completed capabilities into the field to get them into the hands of the users and incorporated their feedback to make improvements.

Concept development, a period of discovery and hypothesis experimentation, precedes prototyping. Concepts are generated along the joint concept development path through a series of wargames and experiments. In collaboration with service, combatant command, joint staff, defense agency, and multinational peers, we are exploring promising new ideas and concepts. We begin to

refine them through an experimentation process that begins by testing hypotheses and ends with a demonstrated capability. Concepts that meet specific requirements are eventually given to teams of specialists who convert them to prototypes.

Based on how these concepts perform, we make recommendations to senior leaders that help them decide how to guide joint experimentation and invest military resources. Work performed on joint concept development is dedicated to making long-term improvements to military capability. The focus is on making the next decade's improvements to joint warfighting.

Expanding the Experimental Ground

One of the most significant ways to improve our perspective in this campaign is by making every effort to expand the scope of participants in experimentation. This ensures that the widest array of partners is included in our activities. We call this effort to enlarge the scope of our campaign "expanding the experimental ground." Expanding our scope occurs as we conduct prototype experimentation in combatant command exercises, co-evolve service and joint concepts and capabilities in what were service wargames (but are now joint, cosponsored wargames), and incorporate lessons learned from ongoing operations. It also occurs as we interact with organizations outside DOD and tap into "leading minds" around the nation and the world, work with other nations that want to contribute to military experimentation, pursue innovative methods of testing, and explore new concepts.

Millennium Challenge 2002 serves as a good example of how expanding the experimental ground works to improve warfighting potential. This warfighting experiment used a synthetic environment with a mix of live and simulated forces, along with current and projected military capabilities. During the experiment, Joint Forces Command developed, tested, and then integrated a series of concepts into a warfighting scenario that was based on a set of conditions we might expect to face in 2007. Millennium Challenge 2002 was the most comprehensive joint military experiment ever conducted, involving 13,500 men and women at 25 locations across the United States.

Today we have expanded the experimental ground even further by conducting more frequent small-scale events in addition to less frequent large-scale events like Millennium Challenge. Multiple small-scale events expand the experimental base both in long-term concept development and near-term prototyping. The combatant commands, services, as well as multinational and interagency partners, are better able to participate, particularly given JFCOM's capabilities to distribute joint experimentation activities virtually. These events also allow us to take more intellectual risk in a prudent way, building a culture of innovation. Finally, these events occur at a pace consistent with the turnover of technology, allowing us to keep at the cutting edge of technological development.

JFCOM already has begun embedding prototype experimentation within joint exercises. These prototyping exercises will include 14 different exercises and span 7 combatant commands. Our concepts are being developed primarily in cosponsored wargames and experiments. These cosponsored events focus on development and refinement of the current Joint Operations Concepts (JOpsC), Joint Operating Concepts (JOCs) and other joint operating, functional, and enabling concepts. We have conducted three already, and plan eight more wargames in the coming months. Our involvement with allies and coalition partners has also expanded. We have conducted two distributed multinational experiments with Australia, Canada, the Federal Republic of Germany, France, and the United Kingdom. We currently plan two more in this series to include NATO, and with Poland, Norway, Finland, Sweden, Korea, and Japan as observers. Interagency partnership has also grown, with the Departments of State, Justice, and Treasury connected on a collaborative information environment. In addition, the Department of Commerce and the Agency for International Development will be added shortly.

One key benefit of expanding the experimental ground is the productive exchange of expertise and ideas among organizations that are helping develop joint and multinational concepts and capabilities. While this expanded vision broadens the span of military experts who contribute to the process, it also ensures that joint context is embedded in service and combatant command wargames and exercises. Through this expansion of the experimental ground, more organizations gain access to the capabilities, tools, and information necessary for exploring new and powerful military capabilities. Because of early and frequent collaboration, we are able to translate good ideas into capabilities more quickly. This expansion of experimentation and broadening of partners also nurtures a culture of innovation that affects the evolution of joint military capabilities.

The effort to expand the experimental ground is more than an attempt to move the laboratory to the field. It reflects the desire to create a collaborative atmosphere that encourages partners to integrate their ideas in new ways. The Distributed Continuous Experimentation Environment (DCEE) and the Joint National Training Capability (JNTC) each supports training and experimentation with a mix of actual, constructive, and virtual capabilities.

JFCOM designed and created the Distributed Continuous Experimentation Environment to be a world-class resource—a sophisticated network of high-tech modeling and simulations with a global reach. In an environment that is both virtual and physical, concepts can be tested repeatedly and analyzed rigorously from the time they emerge as ideas until they are ready to be used by warfighters. This distributed laboratory is capable of conducting various experiments, either locally or globally. Because the environment is distributed, our partners, the combatant commands, services, allied nations, or various agencies may participate in experiments at levels appropriate to their needs, interests, and resources. And in many cases, they can participate from their home locations. What is especially valuable about the DCEE is that it both supports and links the two experimental paths, joint prototype and joint concept. As such, the environment serves as a conduit for feeding promising capabilities back and forth between the joint concept development path and the joint prototype path.

In 2004, JFCOM will establish the JNTC to link previously independent service ranges together in a network that can be used for joint training and experimentation. When completely developed, the Joint National Training Capability will provide a real world laboratory to conduct experiments that assess new doctrine, tactics, and procedures using live military forces against professional opposing forces in realistic combat conditions. Lessons learned from JNTC exercises and experiments will be a principal source of insight for generating new operating concepts. The JNTC represents a global network of joint training facilitators composed of live, virtual, and constructive components. This environment works to meld exist-

ing operational and strategic facets of the exercise with live forces, creating a more robust and realistic exercise. The goal is to create an environment where every level of training is conducted within the proper joint context. The JNTC mission incorporates service, interagency, and multinational coalition partners. JNTC will achieve initial operating capability by Fiscal Year 2004 (FY04) and final operating capability by FY09.

JFCOM assists in promoting the transformation of our nation's military, including its warfighting culture. This transformation will emphasize a change from a force that focused on the deconfliction of service capabilities, to a warfighting force that is coherently joint, collaboratively coordinated, effects-based, and network-centric. A transformed force has coherent capabilities that are born and fielded via a collaborative joint process. This requires that we work with all who might have a stake in transforming our military, making sure our collective efforts are focused and integrated.

To fulfill this mission, we follow a deliberate methodology. First, we receive guidance, principally in the form of the Chairman's Joint Experimentation Guidance. This guidance provides the focus of our concept development and experimentation. Through collaboration with other combatant commands, the services, the joint staff, Office of the Secretary of Defense, and multinational partners, we determine which wargames we should co-sponsor. JFCOM co-sponsors approximately two service or combatant command wargames every 6 months. These wargames help refine joint concepts, produce insights and implications for future experimentation, and guide investments in our military forces. Finally, on a semi-annual basis, JFCOM will package recommendations for the Chairman, combatant commanders, the Joint Chiefs, and other senior leaders. Their iterative guidance and directives drive both paths of the joint concept development and experimentation campaign.

Recommendations to improve joint force capabilities will be packaged in terms of the seven critical considerations: doctrine, organization, training, materiel, leadership, personnel, and facilities. These Transformation Change Packages may also suggest what sort of changes must take place in terms of policy and culture to ensure that innovation becomes an integral part of the way we think about military operations. One point that we may never forget is that our work has a vital impact on the military strength of our country. As such, any recommendations must be based on a reliable body of knowledge, if we expect senior leaders to trust the accuracy of our information and to act on each recommendation with confidence.

Coordination of this expansive partnership falls to a set of service and combatant command general and flag officers, who regularly align activities. By encouraging a culture of collaboration, creativity, and intelligent risk taking, JFCOM can help transform our military into a force that meets new and unexpected challenges, with a rich assortment of resources and innovative capabilities.

The Joint Prototype Path

A prototype is an original type or form of an object that can be evaluated in terms of its design, performance, and production potential.[12] Prototypes—models on which later stages of development are based or judged—have inherent attributes that make them valuable tools in promoting and sustaining transformation. The process of prototyping is integral to military transformation because modeling and experimentation are crucial to refining concepts and bringing ideas to physical form.

During the evolution of a prototype, four important activities occur. First, we conduct experimentation under field conditions. Second, we get immediate feedback from users as to what works and what does not. Third, we use the prototype in multiple environments to ensure the final product will provide superior results in every combatant command area of responsibility. Finally, we prepare the prototype to become an institutionalized capability by incorporating it into doctrine, developing a training regimen, and making organizational or materiel adjustments. The currently approved prototypes are:

- Standing Joint Force HQ: a standing joint command and control element.
- Collaborative Information Environment: a tool and process that provides common situational awareness, understanding, and collaborative workspace for decisionmakers and staffs without today's time and space limitations.
- Operational Net Assessment: a product, process, and organization all focused upon understanding the operational environment as well as the effects of friendly actions.
- Effects-Based Operations: a method of planning, preparing, and executing operations in which the focus is on achieving common effects on adversaries.
- Joint Interagency Coordination Group: an advisory element on the commander's staff that facilitates information sharing and coordinated action across the interagency community.
- Joint Fires Initiative: processes and tools that improve the Joint Force's capability to apply fires from any force in support of any other.
- Joint Logistics (Common Relevant Operating Picture): a tool that addresses the deployment, employment, and sustainment for a coherently joint and multinational force.

There are several key advantages to accelerating the speed with which prototypes reach the field. Delivering prototypes to the field early provides combatant commanders with new capabilities that are often more effective than what is currently in use. This practice also multiplies the locations of experimentation. Experimenting in multiple locations provides us with multiple data points with which we can measure the value of new prototypes. As the accompanying list illustrates, the joint prototype path improves warfighting, encourages continuous experimentation, accelerates transformation, and incorporates feedback from combatant commanders and other partners.

We have made enormous strides in developing partnerships with groups that are committed to strengthening military capability. A look at the Standing Joint Force HQ prototype shows how the partnership process is working.

JFCOM is committed to delivering the Standing Joint Force HQ as a weapons system, completely integrated with its core concepts, training strategy and programs, standards, manning plan, and supporting materiel systems. To achieve this goal, the efforts of each service, as well as other stakeholders are coordinated, to make sure that materiel components are integrated in a manner that enables us to deliver this capability on time. As this "weapon system" is established and refined, improvements are continuously introduced that come from operational experience or experimental activity.

For a concept to complete its course on the prototype path, it must meet two conditions. First, it must show its value to the warfighter. Second, the concept must continue to improve incrementally as it is tested in the operational and exercise environments. Joint Forces Command uses a set of standards, or metrics, to evaluate the effectiveness of individual experiments we are conducting along the

prototype path. These metrics measure our progress with experimentation, the value each prototype adds to our military capability, and the payoff and risk management associated with each product.

Joint Concept Development Path and Future Capabilities

While the joint prototype path focuses on improving *current* military capability, the joint concept development path helps us improve *future* warfighting capabilities. To achieve these longer-term improvements, we rely on an iterative experimentation program that is based on small, more frequent experiments. This program represents a shift from our earlier practice of conducting fewer, more extensive experiments. Our concept development wargames and experiments use common scenarios to examine specific issues that relate to future and combined joint warfighting. Based on the observations, insights and implications generated by these experiments, JFCOM makes recommendations to the Chairman, combatant commanders, the Joint Chiefs, and other senior leaders. These recommendations affect the development of future programs, as well as the course of future experimentation.

To improve joint concept experimentation effectiveness, we use four common scenarios:

- Major combat operations against an adversary with a global WMD threat and robust regional antiaccess capability.
- Joint operations in an urban environment.
- Operations against a nonstate actor with significant regional combat capability, access to weapons of mass effect (WME), and ties to global terrorist organizations.
- Operations in a faltering or failing state that has regional WMD/WME capability.

These scenarios reflect current and future threats based on the geopolitical and military realities we see emerging between now and 2020. This common set of scenarios encompasses most of the range of military operations and contains a variety of adversaries, from conventional enemies to adversaries who operate in the cusp between military combat and criminal activity. They were specifically developed to maintain consistency and correlation with defense planning scenarios, observe classification guidance, yet permit multinational participation in experimentation. Each scenario presents a range of military challenges, and we have evaluated those challenges to determine which sets of issues call for more thorough experimentation.

The approved scenarios are conditions in which we investigate the major challenges that senior DOD leaders, the combatant commands, and the services have identified as the focus of Joint Concept Development:

Achieving decision superiority: generating and sustaining high-quality, shared situation understanding so that we can make decisions and take actions—at the strategic, operational, and tactical levels and within an interagency and multinational environment—faster than any adversary; proper decentralization in a global, distributed, and fully networked environment.

Creating coherent effects (lethal and nonlethal, kinetic and nonkinetic: harmonizing military (conventional and special operations), interagency, and multinational activities at the strategic, operational and tactical levels against any type of adversary—from conventional enemies to those who operate in the cusp between combatant and criminal; developing adaptive leaders and organizations.

Conducting and supporting distributed operations: planning, preparing, and executing (deploy, fight, command and control, and sustain) simultaneously in multiple theaters and widely distributed points of action within each theater—even if the theaters contain very immature infrastructures and when we must operate in a significant antiaccess environment—while denying sanctuaries and protecting ourselves from homeland to point of action.

In collaboration with our partners, we further decomposed these challenges into sets of joint issues. The joint concept development path, through a distributed partnering methodology, serves as the integrating process for exploring these issues.

The Joint Operations Concepts and four Joint Operating Concepts, which include Major Combat Operations, Stability Operations, Strategic Deterrence, and Homeland Security together with an associated family of functional and enabling concepts is one of the main outputs of concept development experimentation. We encourage innovation through the use of alternative approaches and the competition of ideas. The concept development and experimentation program uses several joint approaches from the combatant commands and services as a means to ensure the JOpsC family of concepts include "best of breed" ideas. Concept development explores alternative concepts and does not rely on a "one point" solution that may run the risk of single point of failure or leave the United States susceptible to strategic surprise.

The role of JFCOM is to work with those who have a stake in this process—combatant commands, services, and other partners—to make sure that experimentation along the joint concept development path remains anchored to operational requirements. We also want to be certain that this joint approach is truly a joint, collective effort, not service-centric, because it is through collaboration that we can resolve the challenges facing our military with innovative solutions. JFCOM serves as a focal point for experimental activities that occur along the joint concept development path. These activities bring the services together using shared scenarios, modeling and simulation tools, analytical tools, and assessments.

A joint context is valuable for a number of key reasons. The joint context ensures that a joint perspective informs the creative process right from the start and allows the co-evolution of service and joint concepts. This co-evolution ensures that joint capabilities are explored from the very beginning of the force development process. Capabilities that are meant to be fundamentally joint are best conceived jointly. Taking a joint approach to problem solving also reduces the likelihood of duplicating our efforts and helps reduce the number of experiments. This approach also allows partners to learn together throughout the process and can improve stability and predictability in scheduling as we leverage events for mutual benefit. The joint approach encourages an interactive and iterative joint environment that integrates the right service, combatant command, and multinational and government agency participation.

This joint approach is best exemplified by how the combatant commands, the services, the joint staff, and JFCOM are collaboratively developing the Joint Operations concepts as well as the family of subordinate Joint Operating, Functional, and Enabling Concepts. The overarching JOpsC describes how the Joint Force will operate in

a complex environment within the next 15 to 20 years and describes the coordinated development of service and combatant command capabilities:

- Achieve common understanding of all dimensions of the battlespace throughout the joint force.
- Make joint decisions and take action throughout the joint force faster than the opponent.
- Adapt in scope, scale, and method as the situation requires.
- Rapidly deploy selected portions of the joint force that can immediately transition to execution, even in the absence of developed infrastructure.
- Create and sustain continuous pressure throughout the battlespace for as little or as long as it take to accomplish strategic or operational aims.
- Disintegrate, disorient, dislocate, or destroy any opponent with a combination of lethal and nonlethal means.
- Conduct deployment and sustainment activities in support of multiple simultaneous, distributed, decentralized battles and campaigns.
- Accomplish all of the above in an inter-agency and multinational context.

Joint Operating Concepts further develop key areas of the JOpsC. Focusing at the operational-level, JOCs integrate functional and enabling concepts to describe how a Joint Force Commander will plan, prepare, deploy, employ and sustain a joint force given a specific operation or combination of operations. The JOCs will also provide a detailed conceptual perspective for joint experimentation and assessment activities. Also developed collaboratively through this process, functional concepts utilize the JOCs to amplify a particular military function, while enabling concepts, the most specific of concepts, are descriptions of how particular tasks or procedures are performed within the context of broader functional areas. The concept development path creates a set of venues in which those concepts can be explored, examined, and refined. The venues are especially important because of the competition of ideas that results from the variety of participants: services, combatant commands, multinational, and interagency experts.

Senior leader participation is critical to creating a value-added product from the concept development path. Senior leaders are directly involved in planning and in output. As we plan the activities within the concept development path, joint experimentation guidance, operational lessons learned, and other strategic directives shape the direction and content of the campaign plan and supporting events. As they did with prototyping activities, senior leaders approve the experiment focus for all concept development activities.

Immediately following major concept development events, we report emerging or preliminary observations to senior representatives of the organizations involved and to other invited senior leaders. As an example, following Unified Quest 2003, a joint wargame in which all services and several combatant commands and agencies participated and was cosponsored by the Army and Joint Forces Command, key senior leaders from across the Department of Defense were present for discussions on the preliminary observations, insights, and lessons learned.

Approximately every 6 months, as we synthesize knowledge across major cosponsored events, service events, joint events, and non-DOD research we will provide a set of recommendations supported by experimentation data. Senior leadership then provides appropriate guidance on experimentation or investment.

A Path to Transformation

This campaign plan is intended to provide the synergy described by the Secretary's Transformation Planning Guidance to the broad area of Joint Concept Development and Experimentation. Success of this campaign depends on creation of a collaborative environment among combatant commands, services, and multinational partners. Together, we assess the results of experimentation, draw insights and implications from those experiments, and develop and implement recommendations for change. The recommendations will enable senior leaders to make decisions that determine the most effective way to allocate resources.

The two-path strategy described in this campaign plan lies at the heart of our approach to the transformation of military capabilities. Through a continuous process that integrates innovative thinking, experimentation, and discovery, we help convert mature concepts into prototypes. These prototypes, if they have value, ultimately make their way into the hands of combatant commanders who use them to strengthen their warfighting capability. Ultimately, the result will be to assist in moving the meaning of "joint" from merely "deconflicting" the forces of each service to creating a coherently joint force.

JFCOM is one part of a large, DOD-wide effort to foster innovation. Prototyping, cosponsorship, alternative approaches, embedding experiments in exercises, and expanding the experimental ground all contribute to fostering that new, innovative culture. Millennium Challenge 2002 started us on the track of innovation. JFCOM's experimental activities over the past year have widened the track and accelerated our progress down-track significantly. Collaborative efforts in the coming years will build on these successes.

This plan's measure of success is in generating real improvements in the military capability for warfighters, including our multinational partners. The intended outcome—a fundamentally joint, network-centric, distributed joint force capable of rapid decision superiority and massed effects across the battlespace—will undeniably advance our defense strategy and, therefore, enhance the freedom, peace, and security we seek as a nation.

Notes and additional figures are available at:
www.ndu.edu/ctnsp/defense_horizons

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